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ABSTRACTS FROM THE ORIGINAL PAPERS.

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Table for P_H Values Corresponding to Electromotive Forces determined in Quinhydrone Electrode Measurements.

By Arao ITANO and Katsumi HOSODA.

(*Division of Agricultural Chemistry & Microbiology, Ōhara Institute for Agricultural Research, Kurashiki, Okayama-Ken, Japan.*)

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In our previous publication⑴, an investigation on the Biilman's Quinhydrone electrode for determination of hydrogen ion concentration was reported in regard to several points observed in our practice. This paper presents a table of P_H values corresponding to electromotive forces determined by the use of quinhydrone electrode for both cases when it is employed in conjunction with the N/10 KCl calomel and the standard quinhydrone electrode.

In preparing the table, the calculations have been made for every two millivolts on the acid range up to $P_H 5$, and for every millivolt above that up to the limit of application of the method, i. e. P_H 8.5. Thus the somewhat tedious computations are avoided by using this table.

This table was prepared in appreciation of a similar table⑵ on P_H, H^+ and OH^- values, on the H_2 electrode, published by the University of California Press, and has been very useful. The authors hope that this table will be serviceable to the workers in this field.

⑴ A. Itano and K. Hosoda, Journal of the Agr. Chem. Soc. (Japan.) Vol.2, No.2. p 13, 1926.

⑵ C. L. A. Smith and D. R. Hoagland, Univ. of California, Publications in Physiology, 5, 4. p. 23-69, March, 1919.

Discussions on the Table :

Since the theoretical basis for the calculation of such table is so well known that it is obvious to state here in detail. However some factors involved in the calculation are noted below ;

A. Formulae.

The formula II and III(1) without the temperature correction or in other words $t=18$, were used in our calculation respectively according to a chain employed in the measurement. That is,

Formula II. $P_H=6.35-\frac{\pi}{0.0577}$

is used, for

Hg−HgCl	N/10KCl	Sat. KCl	Unknown solution. saturated with quinhydrone.	Pt (blank)

Formula III. $P_H=2.04+\frac{\pi}{0.0577}$

is used, for

Pt (blank)	Quinhydrone HCl 0.01N KCl 0.09N	Sat. KCl	Unknown solution. saturated with quinhydrone.	Pt (blank)

Since the thermodynamical factor, 0.0577 in the formulae is $\frac{RT}{nF}$ at 18°C, in the well known Nernst's formula our calculations hold correct for that temperature only. For other temperature, the correction should be applied by using the following multiplying factor for a particular working temperature unless the formulae with the temperature correction are used.

The multiplying factors given below, were calculated upon the following basis :

A. The Nernst equation for the calculation of hydrogen ion concentration,

$$\pi=\frac{RT}{nF}\ln\frac{1}{(C_H)} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots(A)$$

is used, where

π = Difference of potential between the E. M. F. measured and the potential of the particular calomel electrode.

R = Gas constant in volt coulomb, (8.3129).

T = Absolute temperature, (273.09–18).

n = Valency of hydrogen, (1).

F = Faraday constant, (96494).

ln = Natural logarithum. $\ln\frac{1}{C_H}=\frac{1}{0.4343}\log_{10}\frac{1}{C_H}$.

C_H = Concentration of hydrogen ion to be determined.

Substituting the numerical value in the above equation. (A), we have,

$$\pi = \frac{8.3129\ T}{96497 \times 0.4343} \log_{10} \frac{1}{C_H} \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots (B)$$

$$= 0.00019837 \times (273.09 + 18) \log_{10} \frac{1}{C_H}$$

$$= 0.0577\ \log_{10} \frac{1}{C_H} = 0.0577\ P_H.$$

$$\text{or}\quad P_H = \frac{\pi}{0.0577}$$

As it will be seen from the equation B, the value $\frac{RT}{nF}$ changes with the temperature, i. e. 0.00019837 per one degree. It was expressed in the Sörensen's formula as $0.0577 + 0.0002\ (t-18)$. Upon this basis, the following factors were calculated for convenience.

Also it should be noted that π, in the Biilman's equation, designates the potential measured in relation to the particular standard electrode used, and it is used in our table as such.

Table I.

Factors.

Temperature, °C.	Factors (Multiply).
15	1.011
16	1.007
17	1.003
18	1.000
19	0.997
20	0.993
21	0.990
22	0.986
23	0.983
24	0.980
25	0.976

For example :

A. At 15°C, if π was found to be 0.105, measured by the $(Q-C)$ chain, then the value of π at 18°C will be

$0.105 \times 1.011 = 0.106+$

The P_H value for this, will be found in the table as **4.513**.

B. By the $(Q-Qs)$ chain, if π was found to be 0.1414 at 15°C, then the value of π at 18°C will be

$0.141 \times 1.011 = 0.143-$ or P_H 4.518 will be found in the table.

Notes : Although the authors checked the figures, some errors might have been overlooked among so many of them, and we invite any suggestions or corrections to improve the table.

Table II.

P_H Values Corresponding to Electromotive Forces, π.

Q = Quinhydrone electrode :

C = N 10 KCl calomel electrode :

Q_S = Standard quinhydrone 〃 .

Formula.	$P_H = 6.35 - \frac{\pi}{0.0577}$		$P_H = 2.04 + \frac{\pi}{0.0577}$	
Chain.	(Q − C)		(Q − Q_S)	
	π	P_H	π	P_H
	0.366	0.007	−0.119	0.012
	0.364	0.042	−0.115	0.049
	0.362	0.077	−0.113	0.082
	0.360	0.111	−0.111	0.116
	0.358	0.146	−0.109	0.151
	0.356	0.181	−0.107	0.186
	0.354	0.215	−0.105	0.220
	0.352	0.249	−0.103	0.255
	0.350	0.293	−0.101	0.290
	0.348	0.319	−0.099	0.324
	0.346	0.354	−0.097	0.359
	0.344	0.388	−0.095	0.394
	0.342	0.423	−0.093	0.428
	0.340	0.458	−0.091	0.463
	0.338	0.492	−0.089	0.498
	0.336	0.527	−0.087	0.532
	0.334	0.561	−0.085	0.567
	0.332	0.596	−0.083	0.602
	0.330	0.631	−0.081	0.636
	0.328	0.665	−0.079	0.671
	0.326	0.700	−0.077	0.706
	0.324	0.735	−0.075	0.740
	0.322	0.769	−0.073	0.775
	0.320	0.804	−0.071	0.809
	0.318	0.839	−0.069	0.844
	0.316	0.873	−0.067	0.879

Chain.	$(Q - C)$		$(Q - Q_S)$	
	π	P_H	π	P_H
	0.314	0.908	−0.065	0.913
	0.312	0.943	−0.063	0.948
	0.310	0.977	−0.061	0.983
	0.308	1.011	−0.059	1.017
	0.306	1.049	−0.057	1.052
	0.304	1.081	−0.055	1.087
	0.302	1.116	−0.053	1.121
	0.300	1.151	−0.051	1.156
	0.298	1.185	−0.049	1.191
	0.296	1.220	−0.047	1.226
	0.294	1.255	−0.045	1.260
	0.292	1.289	−0.043	1.295
	0.290	1.324	−0.041	1.329
	0.288	1.359	−0.039	1.364
	0.286	1.393	−0.037	1.399
	0.284	1.428	−0.035	1.433
	0.282	1.463	−0.033	1.468
	0.280	1.497	−0.031	1.503
	0.278	1.532	−0.029	1.537
	0.276	1.567	−0.027	1.572
	0.274	1.601	−0.025	1.607
	0.272	1.636	−0.023	1.641
	0.270	1.671	−6.021	1.676
	0.268	1.705	−0.019	1.711
	0.266	1.740	−0.017	1.745
	0.264	1.775	−0.015	1.780
	0.262	1.809	−0.013	1.815
	0.260	1.844	−0.011	1.849
	0.258	1.879	−0.009	1.884
	0.256	1.914	−0.007	1.919
	0.254	1.948	−0.005	1.953
	0.252	1.983	−0.003	1.988
	0.250	2.017	−0.001	2.023
	0.248	2.052	0.001	2.057
	0.246	2.087	0.003	2.092
	0.244	2.121	0.005	2.127
	0.242	2.156	0.007	2.161
	0.240	2.191	0.009	2.196

Chain.	(Q − C)		(Q − Q_S)	
	π	P_H	π	P_H
	0.238	2.225	0.011	2.231
	0.236	2.260	0.013	2.265
	0.234	2.295	0.015	2.300
	0.232	2.329	0.017	2.335
	0.230	2.364	0.019	2.369
	0.228	2.399	0.021	2.404
	0.226	2.433	0.023	2.439
	0.224	2.468	0.025	2.473
	0.222	2.503	0.027	2.508
	0.220	2.537	0.029	2.543
	0.218	2.572	0.031	2.577
	0.216	2.606	0.033	2.612
	0.214	2.641	0.035	2.647
	0.212	2.676	0.037	2.681
	0.210	2.711	0.039	2.716
	0.208	2.745	0.041	2.751
	0.206	2.780	0.043	2.785
	0.204	2.815	0.045	2.820
	0.202	2.849	0.047	2.854
	0.200	2.884	0.049	2.889
	0.198	2.919	0.051	2.924
	0.196	2.953	0.053	2.959
	0.194	2.988	0.055	2.993
	0.192	3.023	0.057	3.028
	0.190	3.057	0.059	3.063
	0.188	3.092	0.061	3.097
	0.186	3.127	0.063	3.132
	0.184	3.161	0.065	3.167
	0.182	3.196	0.067	3.201
	0.180	3.231	0.069	3.236
	0.178	3.265	0.071	3.271
	0.176	3.300	0.073	3.305
	0.174	3.335	0.075	3.340
	0.172	3.370	0.077	3.374
	0.170	3.404	0.079	3.409
	0.168	3.439	0.081	3.444
	0.166	3.473	0.083	3.478
	0.164	3.508	0.085	3.513

Chain.	$(Q - C)$		$(Q - Q_s)$	
	π	P_H	π	P_H
	0.162	3.542	0.087	3.548
	0.160	3.577	0.089	3.582
	0.158	3.612	0.091	3.617
	0.156	3.646	0.093	3.652
	0.154	3.681	0.095	3.686
	0.152	3.716	0.097	3.721
	0.150	3.750	0.099	3.756
	0.148	3.785	0.101	3.790
	0.146	3.820	0.103	3.825
	0.144	3.854	0.105	3.860
	0.142	3.889	0.107	3.894
	0.140	3.924	0.109	3.929
	0.138	3.958	0.111	3.964
	0.136	3.993	0.113	3.998
	0.134	4.028	0.115	4.033
	0.132	4.062	0.117	4.068
	0.130	4.097	0.119	4.102
	0.128	4.132	0.121	4.137
	0.126	4.166	0.123	4.172
	0.124	4.201	0.125	4.206
	0.122	4.236	0.127	4.241
	0.120	4.270	0.129	4.276
	0.118	4.305	0.131	4.310
	0.116	4.340	0.133	3.345
	0.114	4.374	0.135	4.380
	0.112	4.409	0.137	4.414
	0.110	4.444	0.139	4.449
	0.108	4.478	0.141	4.484
	0.106	4.513	0.143	4.518
	0.104	4.548	0.145	4.553
	0.102	4.582	0.147	4.588
	0.100	4.617	0.149	4.622
	0.098	4.652	0.151	4.657
	0.096	4.686	0.153	4.692
	0.094	4.721	0.155	4.726
	0.092	4.756	0.157	4.761
	0.090	4.790	0.159	4.796
	0.088	4.825	0.161	4.830

Chain.	(Q − C)		(Q − Q_S)	
	π	P_H	π	P_H
	0.086	4.860	0.163	4.865
	0.084	4.894	0.165	4.900
	0.082	4.929	0.167	4.934
	0.080	4.964	0.169	4.969
	0.078	4.998	0.171	5.004
	0.077	5.016	0.172	5.020
	0.076	5.033	0.173	5.038
	0.075	5.050	0.174	5.055
	0.074	5.068	0.175	5.073
	0.073	5.085	0.176	5.090
	0.072	5.102	0.177	5.108
	0.071	5.119	0.178	5.125
	0.070	5.137	0.179	5.142
	0.069	5.154	0.180	5.159
	0.068	5.172	0.181	5.177
	0.067	5.189	0.182	5.194
	0.066	5.206	0.183	5.212
	0.065	5.223	0.184	5.229
	0.064	5.241	0.185	5.246
	0.063	5.258	0.186	5.263
	0.062	5.276	0.187	5.281
	0.061	5.293	0.188	5.298
	0.060	5.310	0.189	5.316
	0.059	5.327	0.190	5.333
	0.058	5.345	0.191	5.350
	0.057	5.362	0.192	5.367
	0.056	5.379	0.193	5.385
	0.055	5.397	0.194	5.402
	0.054	5.414	0.195	5.420
	0.053	5.431	0.196	5.437
	0.052	5.449	0.197	5.454
	0.051	5.466	0.198	5.471
	0.050	5.483	0.199	5.489
	0.049	5.501	0.200	5.506
	0.048	5.518	0.201	5.524
	0.047	5.536	0.202	5.541
	0.046	5.553	0.203	5.558
	0.045	5.570	0.204	5.575

Chain.	(Q − C)		(Q − Q_s)	
	π	P_H	π	P_H
	0.044	5.587	0.205	5.593
	0.043	5.605	0.206	5.610
	0.042	5.622	0.207	5.628
	0.041	5.639	0.208	5.645
	0.040	5.657	0.209	5.662
	0.039	5.674	0.210	5.679
	0.038	5.691	0.211	5.697
	0.037	5.709	0.212	5.714
	0.036	5.726	0.213	5.732
	0.035	5.743	0.214	5.749
	0.034	5.761	0.215	5.766
	0.033	5.778	0.216	5.784
	0.032	5.795	0.217	5.801
	0.031	5.813	0.218	5.818
	0.030	5.830	0.219	5.835
	0.029	5.847	0.220	5.853
	0.028	5.865	0.221	5.870
	0.027	5.882	0.222	5.887
	0.026	5.900	0.223	5.905
	0.025	5.917	0.224	5.922
	0.024	5.984	0.225	5.939
	0.023	5.951	0.226	5.957
	0.022	5.969	0.227	5.974
	0.021	5.986	0.228	5.991
	0.020	6.003	0.229	6.009
	0.019	6.021	0.230	6.026
	0.018	6.038	0.231	6.043
	0.017	6.055	0.232	6.061
	0.016	6.073	0.233	6.078
	0.015	6.090	0.234	6.095
	0.014	6.107	0.235	6.113
	0.013	6.125	0.236	6.130
	0.012	6.142	0.237	6.147
	0.011	6.159	0.238	6.165
	0.010	6.177	0.239	6.182
	0.009	6.194	0.240	6.199
	0.008	6.211	0.241	6.217
	0.007	6.229	0.242	6.234

Chain.	$(Q - C)$		$(Q - Q_s)$	
	π	P_H	π	P_H
	0.006	6.246	0.243	6.251
	0.005	6.263	0.244	6.269
	0.004	6.281	0.245	6.286
	0.003	6.298	0.246	5.303
	0.002	6.315	0.247	6.321
	0.001	6.333	0.248	6.338
	0.000	6.350	0.249	6.355
	−0.001	6.367	0.250	6.373
	−0.002	6.385	0.251	6.390
	−0.003	6.402	0.252	6.407
	−0.004	6.419	0.253	6.425
	−0.005	6.437	0.254	6.442
	−0.006	6.454	0.255	6.459
	−0.007	6.471	0.256	6.476
	−0.008	6.489	0.257	6.497
	−0.009	6.506	0.258	6.511
	−0.010	6.523	0.259	6.529
	−0.011	6.541	0.260	6.546
	−0.012	6.558	0.261	6.563
	−0.013	6.575	0.262	6.581
	−0.014	6.593	0.263	6.598
	−0.015	6.610	0.264	6.615
	−0.016	6.627	0.265	6.633
	−0.017	6.645	0.266	6.650
	−0.018	6.662	0.267	6.667
	−0.019	6.679	0.268	6.685
	−0.020	6.697	0.269	6.702
	−0.021	6.714	0.270	6.719
	−0.022	6.731	0.271	6.737
	−0.023	6.749	0.272	6.754
	−0.024	6.766	0.273	6.772
	−0.025	6.783	0.274	6.789
	−0.026	6.800	0.275	6.806
	−0.027	6.818	0.276	6.823
	−0.028	6.835	0.277	6.841
	−0.029	6.853	0.278	6.858
	−0.030	6.870	0.279	6.875
	−0.031	6.887	0.280	6.893

Chain.	(Q − C)		(Q − Qs)	
	π	P_H	π	P_H
	−0.032	6.905	0.281	6.910
	−0 033	6.922	0.282	6.927
	−0.034	6.939	0.283	6.945
	−0.035	6.957	0.284	6.962
	−0.036	6.974	0.285	6.979
	−0.037	6.991	0.286	6.997
	−0.038	7.009	0.287	7.014
	−0.039	7.026	0.288	7.031
	−0.040	7.043	0.289	7.049
	−0.041	7.061	0.290	7.066
	−0.042	7.078	0.291	7.083
	−0.043	7.095	0.292	7.101
	−0.044	7.113	0.293	7.117
	−0.045	7.130	0·294	7.135
	−0.046	7.147	0.295	7.153
	−0.047	7.164	0.296	7.170
	−0.048	7.182	0.297	7.187
	−0.049	7.199	0.298	7.205
	−0.050	7.217	0.299	7.222
	−0.051	7.234	0.300	7.239
	−0.052	7.251	0.301	7.257
	−0.053	7.269	0.302	7.274
	−0.054	7.286	0.303	7.291
	−0.055	7.303	0.304	7.309
	−0.056	7.321	0.305	7.326
	−0.057	7.338	0.306	7.343
	−0.058	7.355	0.307	7.361
	−0.059	7.373	0.308	7.379
	−0.060	7.390	0.309	7.395
	−0.061	7.407	0.310	7.413
	−0.062	7.425	0.311	7.430
	−0.063	7.442	0.312	7.447
	−0.064	7.459	0.313	7.465
	−0.065	7.477	0.314	7.482
	−0.066	7.494	0.315	7.499
	−0.067	7.511	0.316	7.517
	−0.068	7.528	0.317	7.534
	−0.069	7.546	0.318	7.551

Chain.	(Q – C)		(Q – Qs)	
	π	PH	π	PH
	−0.070	7.563	0.319	7.569
	−0.071	7.581	0.320	7.586
	−0.072	7.598	0.321	7.603
	−0.073	7.615	0.322	7.621
	−0.074	7.632	0.323	7.638
	−0.075	7.650	0.324	7.655
	−0.076	7.667	0.325	7.673
	−0.077	7.684	0.326	7.690
	−0.078	7.702	0.327	7.707
	−0.079	7.719	0.328	7.722
	−0.080	7.736	0.329	7.742
	−0.081	7.754	0.330	7.759
	−0.082	7.771	0.331	7.777
	−0.083	7.788	0.332	7.794
	−0.084	7.806	0.333	7.811
	−0.085	7.823	0.334	7.830
	−0.086	7.804	0.335	7.846
	−0.087	7.858	0.336	7.863
	−0.088	7.875	0.337	7.881
	−0.089	7.892	0.338	7.898
	−0.090	7.910	0.339	7.915
	−0.091	7.927	0.340	7.932
	−0.092	7.944	0.341	7.950
	−0.093	7.962	0.342	7.964
	−0.094	7.979	0.343	7.985
	−0.095	7.996	0.344	8.002
	−0.096	8.014	0.345	8.019
	−0.097	8.031	0.346	8.036
	−0.098	8.048	0.347	8.054
	−0.099	8.066	0.348	8.071
	−0.100	8.083	0.349	8.089
	−0.101	8.100	0.350	8.106
	−0.102	8.118	0.351	8.123
	−0.103	8.135	0.352	8.141
	−0.104	8.152	0.353	8.158
	−0.105	8.170	0.354	8.175
	−0.106	8.187	0.355	8.193
	−0.107	8.204	0.356	8.209

Chain.	(Q − C)		(Q − Qs)	
	π	P_H	π	P_H
	−0.108	8.222	0.357	8.227
	−0.109	8.239	0.358	8.244
	−0.110	8.256	0.359	8.262
	−0.111	8.274	0.360	8.279
	−0.112	8.291	0.361	8.296
	−0.113	8.308	0.362	8.313
	−0.114	8.326	0.363	8.331
	−0.115	8.343	0.364	8.348
	−0.116	8.360	0.365	8.366
	−0.117	8.378	0.366	8.383
	—0.118	8.395	0.367	8.400
	−0.119	8.412	0.368	8.418
	−0.120	8.430	0.369	8.435
	−0.121	8.448	0.370	8.452
	−0.122	8.464	0.371	8.470
	−0.123	8.482	0.372	8.487
	−0.124	8.499	0.373	8.504
	−0.125	8.516	0.374	8.522

Studies on Castor-bean Lipase.

II. On the Mechanism of the Action of Castor-bean Lipase.

By Etsuo Takamiya.

(From the Biochemical Laboratory, Department of Agriculture, Kyushu Imperial University, Fukuoka, Japan.)

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W. Connstein, E. Hoyer. H. Wastenberg(1); Y. W. Jalander(2); and R. Willstätter(3) have shown that the velocity constant of the lipase reaction when calculated as an ordinary monomolecular reaction has always decreased step by step during the reaction. A. E. Taylor(4) has on the other hand demonstrated that the action of lipase is that of the monomolecular reaction in a heterogeneous system, but R. Willstätter has pointed out that Taylor obtained accidentally such a result.

These investigators have dealt with such a reaction mixture containing too much substrate and less enzyme, and used an estimating bottle with comparatively small contact–surface. It is obvious from my first paper on this subject that in such a case as described all of the substrate used does not at the same time enter into reaction. Nevertheless all of the investigators discussed the problem as if all of the substrate used entered at once into reaction. Taking these points, therefore, into consideration, experiments were carried out in the present investigation.

From the result of experiments, it came to the conclusion that the action of castor–bean lipase is that of the monomolecular reaction in a heterogeneous system and is in line with that of the dissolution of a solid into a liquid. The action of castor–bean lipase was therefore deduced as such that the lipase forms a kind of intermediate product with the substrate at the contact surface between the substrate and the aqueous solution, and the product dissolves immediately generating alcohols and acids.

(1). Chem. Ber., 35, 3988 (1902)
(2). Biochem. Zs., 36, 435, u. z. 464 (1911)
(3). Zs. f. Phys. Chem., 134, 177 (1924)
(4). Jl. of Biol. Chem., 21, 87 (1906)

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Isolation of Asparagine from Shoots of Soy–beans.

By Ushirō Ojima.

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Germination of soy–beans.

2.530g. of cleanly washed soy–beans (2 shô) were after being immerced in water for 15 hours, sown in the cleanly washed wetted cotton and kept in a dark cellar, where the temperature was kept constant at about 15°–16°C. After 2 days they began to germinate. But many of them were found to be infected by micro–organisms and moreover, it was felt that the temperature was too low for the shoots to grow up. Therefore, after 2 weeks' germination those shoots which were free from the infection were selected, resown in the purified sea–sand, and introduced into a warm house where the temperature ranged between 18°–24°C and kept also in the dark.

After staying here 3 weeks they were removed from the sand, shoots longer than 10 cm. were collected, washed well and were deprived of their endsperm.

The number of the shoots thus obtained was about 62% of the grains originally sown (13,000. grains). They weighed (fresh) 10.5 kg.

Isolation of asparagine.

10.4 kg. of fresh etiolated shoots were defaced and pressed out of the sap. Abont 8.5 L. of sap were obtained. The less were extracted with about 5 L. of water at 50°–80°C. After 2 hours it was pressed again. Both of the pressed sap were put together, boiled to coagulate the protein and filtered. The filtrate was boiled down to about 800 c.c. and set cool, where large transparent rhombic crystals of asparagine separated. The crystals were dissolved again in 400 c.c. of hot water, decolorized with animal charcoal and the filtrate was set aside to cool. It yielded 63 g. of colorless rhombic crystals of asparagine. $[\alpha]_D^{17} = -5.43°$ m. p. = 226°–227°C.

According to Prof. U. Suzuki (The Bul. of the Col. of Agr., Vol. IV No. 5, 1902), shoots of an average length of 18 cm. contain 5.8–6.2 parts of asparagine nitrogen in 100 parts of dry matter; thus the percentage of asparagine amonuting to 27.26–29.14 % of the dry matter. As the percentage of water in the author's case was 95.092 %, asparagine contents in 10.4 kg. of fresh etiolated shoots must have heen 139–149 g. On the other hand, 63 g. of crystallized asparagine correspond to 55.44 g. of asparagine freed from its crystal water. The yield must be thus regarded as 37–40 % of the theoretically possible.

On the Narcotic Action of Essential Oils on the Domestic Mosquitoes.

By Seiji FURUKAWA and Shirō SAHARA.

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Twenty reagent bottles of one litre content, were stopped with loose cotten stoppers, through which a slender glass tube was inserted so as to reach near the bottom of these bottles.

Each of these bottles recieved ten domestic mosquitoes and a piece of filter paper impregnated with a known quantity of essential oil to be tested. After three hours, the number of grams of the essential oils that was required to produce deadly effect on those mosquitoes, was determined by inspecting carefully the conditions of the mosquitoes in each bottle.

In this way 79 samples of essential oils were tested, the results of which are summarised as follows :–

1) Perylla–aldehyde, salicylaldehyde, thymol, citronellal, acetophenon, terpineol, menthol, benzaldehyde, borneol etc. were found effective to cause anaesthesea of the mosquitoes. Perylla–aldehyde was most effective, in this respect.
2) In the homologous series, generally narcotic action increased with the carbon number until a certain limit was reached.
3) In the isomeric compounds, narcotic action has to do with the boiling point. The isomer which has higher boiling point was found to have a stronger narcotic action.
4) In the former experiment on fish, one of the authors (S. Furukawa) could distinguish two factors in narcotic action of chemicals, taken in the wider sense. The one is a poisoning action due to its chemical activity (caused, for example, by the carboxyl group), and the other is the narcotic action in a narrow sense caused by the mechanical action of the molecules in the homologous fatty acid series.

The relation can be clearly seen from the following disgram.

We have now confirmed his results of the previous experiments, as we secured a similar curve of narcotic action as shown in above diagram, though we have heen unable to distinguish such narcotic and poisoning actions, described above.